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IN THE

Supreme Court of the United States

OCTOBER TERM 1979

No. 79-669

DAWSON CHEMICAL COMPANY, CRYSTAL MANUFACTURING CORPORATION, CRYSTAL CHEMICAL COMPANY and HELENA CHEMICAL COMPANY,
Petitioners,

v.

ROHM AND HAAS COMPANY,
Respondent.

MOTION FOR LEAVE TO FILE BRIEF AND BRIEF FOR THE LICENSING EXECUTIVES SOCIETY (U.S.A.), INC., AS *AMICUS CURIAE*

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MOTION OF THE LICENSING EXECUTIVES SOCIETY (U.S.A.), Inc., For Leave to File a Brief as *Amicus Curiae*

The Licensing Executives Society (U.S.A.), Inc. ("LES"), respectfully moves this Court for leave to file the accompanying brief in this case as *amicus curiae*. The consent of the attorney for Respondent has been obtained, but the attorney for Petitioners has refused to consent. The interest of LES in the issue before the Court transcends the interests of the parties to this action. The position of LES favors the decision of the Court of Appeals, and the attorney for Petitioners was so informed.

The question presented by the Petitioners relates to the inherent right of an owner of a patent for the only known use of a composition of matter, *i.e.*, a nonstaple

chemical, not to be compelled to license his competitors. It raises serious problems of compulsory licensing with respect to nonstaple materials having no substantial noninfringing use. Stated more succintly, the issues are:

1. Is the owner of a patent claiming a new process for using a nonstaple chemical, *i.e.*, one having no substantial use other than as claimed in the patent, compelled to license his competitors as a condition to exercising his right to sell the chemical itself?

2. Do 35 U.S.C. §271 (c) and (d) permit the owner of a patent claiming a new use of a nonstaple chemical, *i.e.*, one having no substantial use other than as claimed in the patent, to prohibit unlicensed competitors from selling that chemical admittedly for the use claimed in the patent?

3. Is the owner of a patent claiming a new process of using a nonstaple chemical, *i.e.*, a chemical having no substantial use other than as claimed in the patent, guilty of patent misuse if he sells the chemical (and thus, by operation of law, impliedly licenses purchasers) but otherwise refuses to license under the patent?

LES is a nonprofit corporation organized under the laws of the State of New York. It has over 1600 members in the United States, and an equal number in affiliated foreign societies, all of whom have significant interests and responsibilities regarding innovation, technology development, transfer (licensing), marketing and utilization of inventions by the public. LES members are from both large and small companies as well as universities, individual inventors, attorneys, and consultants.

The members of LES are involved in licensing inventions and technology on behalf of their employers or clients, and most are equally active as licensors and

licensees. Their work involves continuing contact with the financing and generation of new inventions and with problems of bringing innovations from the laboratory to practical use. They are also concerned with the interrelation between patent protection and the ability of an enterprise to attract capital for innovation. They are persons who buy, sell, and attempt to protect very substantial investments in innovation, much of which may be endangered by the position adopted by the District Court and urged by Petitioners here. They, perhaps more so than any other group, are personally acquainted with the real-world economics of innovation and the effects of statutory and other authorities upon technological development, use, and transfer.

The legal issue before the Court has significant public interest implications affecting far more businesses and parties than the parties to the case. Members of LES represent a significant portion of the affected group. LES has no legal interest in the outcome of the case before the Court. However, it has a vital interest in helping to see that the law made in this case will result in encouraging and fostering innovation and major investments in research and development and in making new technology available for the benefit of the public.

LES is concerned with anything which unreasonably discourages innovation without commensurate public benefit. LES opposes compulsory licensing, which would be required by both the District Court decision and the views urged by Petitioners. While recognizing society's need to correct manifest abuse, we believe that minimizing governmental restrictions on the licensing of technology permits the patent system to work as the most effective, proven means for creating new products, processes, jobs and industry, enhancing trade, and encouraging competition.

LES and its members view with the greatest interest and concern the possibility that some important aspect of the facts and legal questions before this Court might go unconsidered in the briefs and arguments presented by the parties and other *amici*. Therefore, we urge the Court to grant us leave to file the annexed brief *amicus curiae* instanter.

Respectfully submitted,

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Respondent.

BRIEF ON THE BEHALF OF LICENSING EXECUTIVES SOCIETY (U.S.A.), INC. AS *AMICUS CURIAE*

INTEREST OF THE AMICUS CURIAE

The issues presented in this matter and the interest of LES in those issues are set forth in the accompanying Motion for Leave to file a Brief as *Amicus Curiae.* We are concerned with the chilling effect on innovation and the weakening of the patent system which would inevitably flow from the result sought by the Petitioners.

SUMMARY OF ARGUMENT

In procuring and enforcing its rights under the patent in suit, Rohm and Haas (Respondent) has not taken anything from anybody. Prior to the invention disclosed in the patent in suit, propanil had no known practical or commercial use. As a result of its ingenuity, effort and willingness to accept financial risk, Respondent discovered and patented a highly beneficial use for propanil as a selective, post-emergent agent to control weeds in rice crops. Respondent thus created a market for propanil, a market which was previously nonexistent.

Respondent began developing that market by selling propanil to rice farmers who, by operation of law, receive the right to use propanil as disclosed in the patent. Exercising its basic rights as a patentee, Respondent refused to license Petitioners—Respondent's competitors—under the patent. Nevertheless, Petitioners, who had no part in developing the only practical use for propanil, sell propanil to rice farmers, thus exploiting the market created by Respondent's invention. After an exhaustive review of the applicable authorities, the Court of Appeals quite properly held that Petitioners' conduct constituted contributory infringement, and that, in seeking to halt that conduct, Respondent had done nothing more than the law allowed.

In urging reversal of the Court of Appeals' decision, Petitioners argue, *inter alia*, that Respondent's failure to license contributory infringers constitutes patent misuse. As demonstrated below, Petitioners' argument inevitably leads to the conclusion that Respondent must license competitiors as a prerequisite to *selling* a nonstaple chemical, *i.e.*, one which has no use other than in practicing Respondent's invention.

We submit that no one would be willing to accept the risk and spend the time, resources and effort to discover and develop an innovative use for an existing but otherwise unusable nonstaple compound if, in any event, he will be compelled as a condition to participating in the market he thus creates, to license competitors who invest nothing, risk nothing, and contribute nothing. That result—which is contrary to the constitutional purpose of patents—is plainly not required under the patent laws or any other law. Any public benefit it may arguably foster would clearly be outweighed by the administrative difficulties and expense it would inevitably demand and by the disincentives it would pose to further innovation.

ARGUMENT

POINT I 35 USC § 271 (c) and (d) PRECISELY EXPRESS CONGRESSIONAL INTENT AND SUPPORT THE COURT OF APPEALS' DECISION HEREIN.

In considering the place of 35 U.S.C. §271(d) in the overall scheme of the United States patent laws, it is appropriate first to remember just what rights a patentee is granted by a patent. 35 U.S.C. § 154 specifies that:

> Every patent shall contain . . . a grant to the patentee . . . for the term of seventeen years . . . of the right to exclude others from making, using, or selling the invention throughout the United States, ...

The "right to exclude" includes not only the right to bring a civil action against an infringer, 35 U.S.C. § 281, but also includes the right to refuse to license others to make, use or sell the statutorily protected discovery. *Hartford Empire Co.* v. *United States*, 323 U.S. 386, 417 (1945); *Crown Die & Tool Co.* v. *Nye Tool & Mach. Works*, 261 U.S. 24, 34, 35, 67 (1922); *Motion Picture Patents Co.* v. *Universal Film*

Mfg. Co., 243 U.S. 502, 510, 514 (1917); *Continental Paper Bag Co.* v. *Eastern Paper Bag Co.*, 210 U.S. 405, 425 (1908) and *E. Bement & Sons* v. *National Harrow Co.*, 186 U.S. 70, 90 (1902).[1]

The present case relates to *contributory* infringement which is now defined in the statute, 35 U.S.C. § 271(c):

> (c) Whoever sells a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be expressly made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.

It should be emphasized that the statute expressly refers to sale of "a component of a patented" invention and a "material or apparatus for use in practicing a patented process." Thus by definition in the statute itself, contributory infringement occurs, under specifically limited conditions, when something *less* than the entire claimed invention is sold. If this were not so there would be no need to distinguish § 271(c) contributory infringement from § 271(a) direct infringement.[2] This does not "expand" the statutory grant. Rather it is a natural and necessary part of that grant, which includes the right under § 281 to sue infringers, and without which the

[1] The Brief for the United States as Amicus Curiae entirely ignores this basic right which is part of every patent grant.

[2] Section 271(a) defines direct infringement:

> [W]hoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

grant would be incomplete. Before a § 271(c) contributory infringement is actionable, the following requirements must be met:

> 1. There must be a direct (§ 271(a)) infringement involving the "component" or "material or apparatus," *Aro Mfg. Co.*, v. *Convertible Top Replacement Co.*, 377 U.S. 476 (1964) [*Aro II*], and *Deepsouth Packing Co.* v. *Laitram Corp.*, 406 U.S. 518 (1972).
>
> 2. The "component" or "material or apparatus" sold by the alleged contributory infringer must constitute "a *material part* of the [claimed] invention."
>
> 3. The alleged contributory infringer must have actual *knowledge* that the "component" or "material or apparatus" is "especially made or especially adapted for use in" a direct (§ 271(a)) infringement of the patent.
>
> 4. The "component" or "material or apparatus" must not be a "staple article or commodity of commerce *suitable for substantial noninfringing use.*"

The wording of § 271(c), read as a whole, unmistakably reveals that a patentee's rights extend, in the very specific circumstances enumerated above, to exclusion of sales of nonstaple components having no meaningful use other than in infringing the patent.

The law of contributory infringement originated with the courts, and this Court has been instrumental in the adoption and development of that law. However, in the *Mercoid Cases* (*Mercoid Corp.* v. *Mid-Continent Invest. Co.*, 320 U.S. 661 (1944) and *Mercoid Corp.* v. *Minneapolis Honeywell Regulator Co.*, 320 U.S. 680 (1944)), the Court severely eroded the law of contributory infringement, overweighting the doctrine of patent misuse. In the words of Mr. Justice Douglas:

> The result of this decision, . . . is to limit substantially the doctrine of contributory infringement. What

residuum may be left we need not stop to consider. [320 U.S. at 669]

As a direct result of the *Mercoid* decision, Congress enacted legislation to revive the most salutary aspects of the prior common law of contributory infringement. Congress recognized and considered the inherent tension between the public policies of the patent laws vis-a-vis the doctrine of patent misuse and the antitrust laws. Contributory infringement was expressly returned to the patent law by 35 U.S.C. § 271(c). Additionally, certain acts of patentees which Congress found to be consistent with a patentee's right to exclude, and not inconsistent with the public policies underpinning the doctrine of patent misuse, were expressly approved in the statute, 35 U.S.C. § 271(d):

> (d) No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following: (1) derived revenue from acts which if performed by another without his consent would constitute contributory infringement of the patent; (2) licensed or authorized another to perform acts which if performed without his consent would constitute contributory infringement of the patent; (3) sought to enforce his patent rights against infringement or contributory infringement.

It is elementary statutory construction that the "contributory infringement" referred to in § 271(d) must be that defined in § 271(c). Contributory infringement is not otherwise defined or mentioned in the Patent Act.

The 1952 enactment of § 271(c) explicitly defined contributory infringement and specified certain acts which a patentee may lawfully do, but which, under

Mercoid and absent § 271(d), might have been considered patent misuse. At that time, even without § 271(d), it was not patent misuse for a patentee to refuse to license his patent.[3] Thus as noted by the Court of Appeals (599 F.2d at 688), § 271(d) reversed the *Mercoid* misuse doctrine when the unpatented component sold is a nonstaple, not suitable for substantial use apart from its use in the claimed invention.[4]

Petitioners admit that "for the purpose of this proceeding it is presumed that Petitioners are contributory infringers under § 271(c)" (Pt. Br. at 6). Petitioners also admit that "propanil is a nonstaple." Thus, the question is whether Respondent's refusal to license—the basic right of any patentee[5]—an admitted contributory infringer to sell a nonstaple composition having no use other than as claimed in the patent constitutes patent misuse.

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[3] *Mercoid*, 320 U.S. at 666.

[4] This Court has already recognized the Congressional intent in § 271. As stated in *Aro II*, 377 at 492:

> ... Congress enacted §271 for the express purpose of reinstating the doctrine of contributory infringement as it had been developed by decisions prior to Mercoid, and of overruling any blanket invalidation of the doctrine that could be found in the Mercoid opinions. See, e.g. 35 USC §§271(c), (d); Hearings, supra, n. 6, at 159, 161-162; and the Aro I opinions of Mr. Justice Black, 365 US at 348-349 and nn. 3-4; Mr. Justice Harlan, id., at 378, n. 6; and Mr. Justice Brennan, id., at 365-367.

As stated earlier by Mr. Justice Harlan dissenting in *Aro Mfg. Co., Inc.* v. *Convertible Top Replacement Co., Inc.*, 365 U.S. 336 (1961)[*Aro I*]:

> It seems clear from the legislative history of the 1952 Act that Congress intended (1) to reaffirm the doctrine of contributory infringement ... (2) to give the doctrine precedence against a claim of patent misuse as conceived in the Mercoid cases, at least where the misuse is said to inhere simply in assertion of patent rights. [365 U.S. n. 6 at 378]

[5] *See* cases cited at pp. 3 and 4, *supra*.

The answer, clearly, is no.[6] Respondent's refusal to license is authorized by 35 U.S.C. § 154, which expressly provides patentees with the "right to exclude." Each and every aspect of Respondent's remaining conduct falls within the protection afforded by § 271. Respondent's sale of propanil simply constitutes derivation of revenue from an act, which if performed by another without Respondent's consent would constitute contributory infringement. See § 271(d)(1).[7] Similarly, Respondent's institution of suit against Petitioners is only the enforcement of Respondent's patent rights precisely as authorized by § 281 and § 271(d)(3).

POINT II THE DECISION BY THE COURT OF APPEALS IS FULLY IN ACCORD WITH THE CONSTITUTIONAL PURPOSE AND THE CONGRESSIONAL OBJECTIVE OF THE PATENT LAWS TO ENCOURAGE INVENTION.

A. The Need for Innovation and the Patent Incentive for Encouraging Innovation Have Long Been Recognized as Desirable Public Policies for Creating New Jobs, Additional Industry, Greater Productivity, Increased Trade, and Enhanced Competition.

It is difficult to overstate the importance of ingenuity and innovation as factors in the development of a modern

[6] Directly contrary to the arguments in the Brief of the United States as Amicus Curiae, pp. 6 and 7, Amicus LES submits that Respondent's refusal to license the use of its patent except via the necessarily implied licenses to those who purchase propanil from it would *not* have constituted patent misuse under a long line of this Court's decisions (with the exception of *Mercoid* which was reversed by enactment of §271(d)), *see e.g.*, *Bement*, 186 U.S. at 90.

[7] The fact that purchasers of propanil from Respondent are impliedly licensed by operation of law to use the propanil in the patented process is an inevitable result which cannot be denied or avoided. It is inherent in any such sale. *United States* v. *Univis Lens Co.*, 316 U.S. 241 (1942); also cf., *Adams* v. *Burke*, 84 U.S. (17 Wall.) 453 (1873) and *Aro II*. This necessarily implied licensing does not affect the protection afforded by §271.

industrial society and in the creation of jobs and benefits for the advancement of man. Referring to the constitutional authority, this Court recently summarized the value of the patent incentive in *Kewanee Oil Company* v. *Bicron Corporation*, 416 U.S. 470, 580 (1974):

> The patent laws promote this progress by offering a right of exclusion for a limited period as an incentive for inventors to risk the often enormous costs in terms of time, research, and development. The productive effort thereby fostered will have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens.

It is even more important to encourage invention today than it was when the Constitution was adopted. Any doubt on that score should be dispelled by the widespread recognition increasingly given in the daily press, periodicals, government and scientific studies, and elsewhere, that policies which discourage innovation are a serious threat to the future of this nation. For example, Robert Colton of the National Science Foundation highlights the consequences of innovation lag:

> At the most basic level, less innovation means that fewer new, improved products are available to American consumers in the marketplace. But it also has broader economic effects. Without innovative breakthroughs, industry creates fewer jobs. Factories and equipment become obsolete. Productivity growth declines. And that only feeds the enervating inflationary spiral: if industry cannot turn out goods and services more efficiently, it cannot compensate for rising costs except by hiking prices.[8]

According to the Commerce Department: "All the indicators imply that the rate of U.S. innovation is measurably down." Senator Adlai Stevenson, chairman of the

[8] Newsweek, June 4, 1979, p. 59.

Senate Science, Technology and Space Subcommittee, recently concluded: "In terms of innovation as it relates to productivity and growth, the American economy is stagnant.[9] At this writing, the morning press, reporting on a conference of medical researchers, medical school leaders, drug industry and government officials at Duke University, noted that: "Scientist after scientist referred to a slump in American drug research and a lag behind European counterparts, ...[10]

Published statistics confirm the alarming decline in American innovation. According to a Stanford Research Institute analysis, during the 1950s, 82 percent of the major inventions brought to market were developed in the United States. By the late 1960s, the figure had declined to 55 percent.[11]

Between 1971, the peak year for American inventions, and 1978 the number of patents granted annually to Americans declined 21 percent from 56,000 to 44,000. During the same period, the number of United States patents granted to foreigners rose 300 percent from 8,500 to 26,000.[12] Recent reports state that research and development in the United States, as a percentage of economic output, fell 20 percent between 1968 and 1978 while increasing significantly in both West Germany and Japan.[13] Not surprisingly, the United States now lags behind most other developed countries in manufacturing-productivity growth. In the twenty years following World War II, American industry's productivity grew at an

[9] U.S. News & World Report, Nov. 12, 1979, p. 76.

[10] The Charlotte Observer, March 4, 1980.

[11] Newsweek, June 4, 1979, p. 58.

[12] United States Department of Commerce News, June 13, 1979; Commissioner of Patents and Trademarks Annual Report, Fiscal Year 1979; U.S. News & World Report, Nov. 12, 1979, p. 76.

[13] Science, Vol. 26, Nov. 16, 1979, p. 801.

annual rate of 3.3 percent, but since 1973, the rate has dropped to 1.3 percent.[14]

President Carter, in his Industral Innovation Message to the Congress on October 31, 1979, emphasized that:

> Industrial innovation—the development and commercialization of new products and processes—is an essential element of a strong and growing American economy. It helps ensure economic vitality, improved productivity, international competitiveness, job creation, and an improved quality of life for every American. Further, industrial innovation is necessary if we are to solve some of the Nation's most pressing problems—reducing inflation, providing new energy supplies and better conserving existing supplies, ensuring adequate food for the world's population, protecting the environment and our natural resources, and improving health care.

The importance of innovation was summarized in a report, "National Strategy for Technological Innovation," prepared for the Committee on Commerce, Science, and Transportation, United States Senate:

> The importance of innovation is enormous. It is a key factor in assuring national security, economic vitality, and domestic problem solving. It is essential to increasing productivity; reducing inflation and achieving full employment; meeting international economic competition; developing alternative energy sources and improved methods of conservation; solving enviromental problems; providing effective public services in cities and counties; generating the national wealth required to pay for necessary social services; and in general enhancing the quality of life in our country.[15]

[14] "The Productivity Gap," Newsweek, May 29, 1978, p. 79.

[15] Because of its scope and significance, additional portions of this report, dated October 1979, are reproduced as Attachment "A" to this brief.

We submit that the ruling of the Court of Appeals in this case serves to promote science and encourage invention. It is consistent with the basic purpose of the patent system.[16]

In the context of this case, an inventor who discovers a new use for a known composition, *i.e.*, the sole beneficial use for a nonstaple chemical, can obtain patent protection only in the form of a process patent.[17] The patent defines something which never existed before, the new process for using the nonstaple chemical. The patent incentive provides encouragement to the inventor to search for, discover, develop, and market the invention. Yet, in many instances the most practical way in which the patentee of a process invention may hope to recover his costs and some incentive reward is by manufacturing the nonstaple chemical and selling it himself, in which event, the law exacts for the purchaser an implied license to use the nonstaple in the patented process. Certainly there is

[16] The Commission on the Patent System established by President Johnson stated this to be:

> "The members of the Commission unanimously agreed that a patent system today is capable of continuing to provide an incentive to research, development, and innovation. They have discovered no practical substitute for the unique service it renders.
>
> "First, a patent system provides an incentive to invent by offering the possibility of reward to the inventor and to those who support him. This prospect encourages the expenditure of time and private risk capital in research and development efforts.
>
> "Second, and complementary to the first, a patent system stimulates the investment of additional capital needed for the further development and marketing of the invention."

Report of President's Commission, Harry Huntt Ransom, Simon H. Rifkind, Co-chairmen, Nov. 11, 1966, p. 2.

[17] This is specifically authorized in the 1952 act, 35 U.S.C. § 100(b) providing that "the term 'process' . . . includes a new use of a known . . . composition of matter or material."

nothing in the Constitution or the patent laws which says that the would-be inventor should be discouraged from creating the only beneficial use for a chemical by being burdened by having to license manufacturing competitors.

B. The Decision of the Court of Appeals is Fully Consistent with the Constitutional Purposes of the Patent Act and Does Not Perpetrate Any Harmful or Undesirable Consequences.

The framers of the Constitution recognized that the future of any great nation depends in no small part on the ability to foster and utilize scientific and technological innovations. To that end they included in the Constitution the specific grant to the Congress of the power to secure "to Authors and Inventors the exclusive Right to their respective Writings and Discoveries" in order to "promote the Progress of Science and useful Arts. . . ." (U.S. Const., Art. I, § 8, cl. 8). In exercising the full extent of its authority granted by this clause, the Congress enacted the Patent Act, including § 271.

Only last Term this Court reviewed the purposes of the federal patent system and found them to be:

> "First, patent law seeks to foster and reward invention; second, it promotes disclosure of inventions to stimulate further innovation and to permit the public to practice the invention once the patent expires; third, the stringent requirements for patent protection seek to assure that ideas in the public domain remain there for the free use of the public." *Aronson* v. *Quick Point Pencil Co.*, 440 U.S. 257, 262 (1979).

The Court of Appeals' decision in this case is fully consistent with these purposes because it protects inventors of methods using unpatented nonstaples and thus

encourages other inventors and fosters similar inventions. The Court of Appeals therefore properly carried out the mandate of Congress in the Patent Act and § 271. On the other hand, the Court of Appeals has not, as Petitioners charge, construed § 271 to create a monopoly or to unlawfully extend the patent granted to Respondent.

Respondent has a limited patent on a process for selective, post-emergence weed control by application of propanil. Propanil *per se* is unpatented but has no use other than in Respondent's weed control process. To permit Petitioners to sell propanil which they know has no use apart from Respondent's process robs Respondent of its rights under the patent and conflicts with the congressional desire of granting Respondent the temporary "exclusive right" to its invention.

The Third Circuit's statement that "any incremental increase in patentee income that might result from permitting licensing schemes that would otherwise violate the antitrust laws would be unlikely to effect a patentee's initial decison to invest in innovative activity,[18] cited by Petitioners (Pt. Br. at 35), is inapposite. First, no licensing scheme that would violate the antitrust laws is involved here. Respondent has sought only the rights granted by §§ 154 and 271. Second, there is no other practical way for Respondent to achieve a meaningful reward for its invention. The persons, *i.e.*, the farmer and the aerial applicators, actually practicing the steps of the patented process are numerous, and separately licensing each of them would be difficult, if not impossible. In situations such as this, deriving a reward from the sale of the nonstaple is the only practical means by which the patentee can obtain income for its inventive efforts.

At the same time, no monopoly is granted to Respondent nor is its process patent unlawfully extended to

[18] *Mannington Mills Inc.* v. *Congoleum Industries*, ____F.2d ____, 203 U.S.P.Q. 81, 91, (3d Cir. 1979).

give it exclusive rights over propanil. Petitioners can manufacture and export propanil. So far as weed control is concerned there is no showing that propanil is the only weed controlling substance or that Respondent has a monopoly over even selective, post-emergence weed control by reason of the patent in question. Nor can it be seriously contended that Respondent has a monopoly on propanil. The only rights which Respondent has are those lawfully granted by the Patent Act, *i.e.*, the exclusive use of its process of applying propanil as a selective, post-emergence weed control agent. By rightful operation of § 271, Petitioners cannot sell propanil to farmers because at the present time propanil has no use other than in Respondent's process. It is still open, however, to the Petitioners, and the rest of the world for that matter, to develop a new use for propanil or to invent a new method for applying propanil in weed control. The very purpose of the Constitution and Congress in protecting Respondent in this case is to encourage Petitioners and others to do that very thing.

The decision below thus furthers the Constitution's purpose of the patent system in two ways, it: (1) encourages the making of inventions of the type originally made by Respondent by promising a meaningful economic reward and (2) encourages others to invent other uses for the chemical or other methods of applying it in weed control or other chemicals by excluding others from reaping the rewards rightfully belonging to Respondent. To hold otherwise would deny Respondent its lawfully obtained rights and would harm the public by discouraging invention.

C. The Consequences of Reversing the Fifth Circuit's Decision

As previously noted, the Fifth Circuit's decision not only follows the literal language of 35 U.S.C. § 271, but squarely implements the congressional policy and intent

underlying that statute. By contrast, reinstating the District Court's decision would reinstitute the uncertainties of the *Mercoid Cases* and inevitably lead to inconsistent "misuse" holdings. Additionally, the District Court's decision would mandate application of the most wooden approach to "tying" concepts—an approach, which, as Congress and this Court have recognized, is devoid of economic, practical, and legal rationality. It could also result in duplicative patent litigation at the consumer level, and in compulsory licensing of competing manufacturers, a measure which is contrary to the very nature of a patent. Most importantly, the District Court's decision would inevitably frustrate this nation's acknowledged need to stimulate technological innovation and capital expansion.

1. The District Court's Decision Would Require Compulsory Licensing and Would Pose Disincentives for Technological Progress.

Petitioners suggest that requiring Respondent to grant licenses separate from the sale of propanil would not amount to compulsory licensing (Pt. Br. at 9). However, unlicensed sellers of propanil, a nonstaple chemical, *i.e.* one having no substantial use other than in practicing the invention claimed in the patent are, by definition, contributory infringers. 35 U.S.C. § 271(c). Thus, as both the District Court and the Court of Appeals recognized, Petitioners' suggestion plainly does amount to compulsory licensing[19] and Petitioners' Brief eventually concedes as

[19] The District Court stated (191 U.S.P.Q. at 708):

> The effect of this order compels the patent owner marketing unpatented nonstaple components of his combination patent to first offer licenses to others marketing that component before it seeks equitable relief for contributory infringement. [A combination is not involved in the instant case.]

(footnote continues)

much (*Id.* at 29). Because they would obviously be inconsistent with the "right to exclude" expressly afforded inventors by § 154 of the Patent Act and would, in any event, create an administrative and judicial nightmare, various proposals aimed at compulsory licensing have been rejected repeatedly for the past two centuries.[20] Departures from that policy have been made only in the most extraordinary circumstances and in the most limited manner. Congress has adopted compulsory licensing only in those instances where a vital national interest is directly at stake, for example, where the patented invention is in the field of atomic energy or pollution

(footnote continued)

As the Fifth Circuit observed (599 F.2d at 704 n. 27):

> Defendants would have us impose a *requirement* that a patentee like Rohm & Haas offer erstwhile competitors licenses, available to all comers at a reasonable royalty rate.
>
> * * *
>
> We decline to rule that a patentee *must* license under [§ 271] (d)(2) in order to use his rights under (d)(1) and (d)(3). A general licensing obligation is foreign to a statutory scheme in which patentees are free to suppress entirely or reserve for themselves their inventions.

[20] The first attempt to enact legislation requiring compulsory licensing of patents appeared in the Senate version of the original Patent Act of 1790 (1 Stat. 109). The Senate's provision, however, was deleted in conference. See E. Penrose, *The Economics of the International Patent System* at 176 (1951); Compulsory Licensing of Patents Under Some Non-American Systems, Staff of Subcomm. on Patents, Trademarks and Copyrights of the Senate Comm. on the Judiciary, 85th Cong., 2d Sess. 1, 2 (Comm. Print 1959). From 1911 to 1950, 25 bills, all of which would have required compulsory licensing, were introduced in the House and Senate. All were rejected. See Staff of Senate of Subcomm. on Patents, Trademarks and Copyrights of the Senate Comm. on the Judiciary, 85th Cong., 2d Sess., Compulsory Licensing of Patents—a Legislative History (Comm. Print 1958) (summarizing these bills); *see also* Arnold and Goldstein "Compulsory Licensing: 'Uncentive' for Invention" 7 *Patent L. Rev.* 113, 114, App. at 155-61 (1975).

control, and only then with sharply limiting restrictions carefully drafted to be used only in unlikely circumstances.[21] Similarly, courts have resorted to compulsory licensing, as opposed to adjudications of patent invalidity or unenforceability,[22] only as an extraordinary remedy between particular litigants on highly unusual facts, for example to dispel the effects of *per se* antitrust violations[23] or blatant patent misuse or to reach some balance between a patentee's legitimate rights and an extraordinary public interest in an otherwise totally impractical situation.[24]

[21] *See* 42 U.S.C. § 1857 (h)(6), 2183. Other examples appear in 28 U.S.C. § 1498 (permitting use of a patented invention in manufacturing by or for the United States) and 7 U.S.C. § 2404 (licensing of certain plant variety patents). No such licenses are known by Amicus to have been granted.

[22] Petitioners' attempt to equate mandatory licensing with judicial invalidation of a patent for fraudulent procurement (Pt. Br. at 29) is without merit. The leading "fraud" cases decided by this Court are *Precision Instr. Mfg. Co.* v. *Auto. Maint. Mach. Co.*, 324 U.S. 806 (1945), *Hartford-Empire Co.* v. *United States*, 323 U.S. 386 (1944), *Hazel-Atlas Glass Co.* v. *Hartford-Empire Co.*, 322 U.S. 238 (1940) and *Keystone Driller Co.* v. *General Excavator Co.*, 290 U.S. 240 (1933). These cases are not "compulsory licensing" cases; they simply stand for the fact that the patents respectively in question should never have been granted in the first place, much less licensed.

[23] *United States* v. *Glaxo Group Ltd.*, 410 U.S. 52, 58-59 (1973); *Besser Mfg. Co.* v. *United States*, 343 U.S. 444 (1952); *United States* v. *United States Gypsum Co.*, 340 U.S. 76, 88 (1950); *Ansul Co.* v. *Uniroyal, Inc.*, 448 F.2d 872 (2d. Cir. 1971), *cert. denied*, 404 U.S. 1018 (1972) (price fixing); *United States* v. *Imperial Chem. Inds., Inc.*, 105 F. Supp. 215 (S. D. N.Y. 1952) (antitrust violations); *Allied Res. Prods., Inc.* v. *Heatbath Corp.*, 300 F. Supp. 656 (N.D. Ill. 1969) (patent misuse); *compare United States* v. *National Lead Co.*, 332 U.S. 319 (1947) (noting, despite antitrust violation, that compulsory licensing is not an appropriate remedy "on the facts before us").

[24] *Nerney* v. *N.Y., N.H. & H.R. Co.*, 68 F.2d 734 (2d Cir. 1934) (requiring license to be granted to infringing railroad due to public interest and impracticability in enforcing complete ban at car-interchange points); *City of Milwaukee* v. *Activated*

(footnote continues)

Petitioners' suggestion would necessarily stand § 154 and the existing policy squarely on its head. Instead of being merely a rarely used *remedy*, compulsory licensing—or the failure to abide it—would itself become the *source* of the violation or misuse.

The impracticalities and inefficiencies associated with any requirement for compulsory licensing are obvious. First, compulsory licensing would inevitably mandate the creation of a substantial administrative mechanism, either in the courts or otherwise,[25] to set royalty rates, rates

(footnote continued)

Sludge, Inc., 69 F.2d 577 (7th Cir.), *cert. denied*, 293 U.S. 576 (1934) (requiring municipality's infringing sewage plant to be licensed in order to prevent raw sewage from being dumped into Lake Michigan); *Vitamin Technologist* v. *Wisconsin Alumni Res. Found.*, 145 F.2d 941 (9th Cir. 1945) (refusal to grant injunction aginst infringement of patent which would provide a cheap and plentiful source of Vitamin D); *Hoe* v. *Kahler*, 12 F. 111 (C.C., S.D. N.Y. 1882), *reh. denied*, 25 F. 271 (C.C., S.D. N.Y. 1885), *appeal dismissed on stipulation of counsel*, 131 U.S. 439 (1889) (requiring, in effect, that a royalty free license be granted to a newspaper which was an innocent, secondary infringer and whose interruption would cause public detriment); *Foster* v. *American Mach. & Foundry*, 492 F.2d 1317 (2d Cir.), *cert. denied*, 114 U.S. 1114 (1974) (refusing injunction where patentee refused to sell and where infringer had made massive outlays). Compulsory licensing is still a rare exception to the general and very basic rule that a patentee may refuse to license his patent (See cases cited, *supra* at 3 and 4; *compare Extractol Process* v. *Hiram Walker & Sons*, 153 F.2d 264, 266, 268 (7th Cir. 1946).

[25] Courts ordering compulsory licensing would find themselves retaining jurisdiction of otherwise completed cases in order periodically to redetermine the reasonableness of royalty rates as circumstances change through the life of a compulsorily licensed patent. Compulsory royalty rates would be the subject of endless litigation.

which might have to be periodically adjusted depending, for example, upon price and the number of entrants in the field. Thus, instead of employing the economic forces of the marketplace quickly and efficiently to evaluate the worth of an invention, the compulsory system would employ a somehow omniscient team of government administrators to establish (and periodically reestablish)—at exorbitant and wholly unnecessary expense to the public—what might be a "reasonable" price for each particular license, a determination which would depend not only on the number of licensees in question but upon the terms they might seek: the degree of exclusivity, the territory, the field, and, of course, the value of the invention in each respective context. The difficulties associated with that approach are simply a matter of public record. *E.g., Georgia-Pacific Corp.* v. *United States Plywood-Champion Papers, Inc.*, 318 F.Supp. 1116 (S.D. N.Y. 1970), *modified*, 446 F.2d 295 (2d Cir.), *cert. denied*, 404 U.S. 870 (1971); *Faulkner* v. *Gibbs*, 199 F.2d 635, 639-40 (9th Cir. 1952); *cf. Panduit Corp.* v. *Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1157-64 (6th Cir. 1978); *Trio Process Corp.* v. *L. Goldstein's Sons, Inc.*, 533 F.2d 126, 129-30 (3d Cir. 1975). The delays, distortions, and inefficiencies inherent in that system would exceed even those inherent in any system of governmental price controls.

Second, the availability of a compelled license at rates somehow established by government administrators with respect to all inventions would create an obvious disincentive to engage in research and development. The lazy human tendency to 'replicate not innovate' is a real-life problem in today's world.[26] The knowledge that a compulsory license could be obtained would be a further

[26] See: "Some Tales of 'Copycat' Products Are Best Left Untold, Sterling Drug Learns" The Wall Street Journal, March 11, 1980, p. 16; reproduced as Attachment "B" hereto.

'security blanket' to discourage people from risking money in their own research and development.

To the would-be copyist the cost of procuring a license, at whatever rate might be established by the government, can in no way be equated with the threat of total exclusion.[27] Moreover, there plainly is no incentive for research and development if the researcher knows that whatever market his invention creates can be saturated by free riders unwilling to undertake the risks and financial burdens inherently associated with the development and perfection of that invention.

The inevitable point is that compulsory licensing would not comport with the constitutional object of promoting the useful arts and sciences. U.S. Const. Art. I, § 8. Moreover, given the increasingly uncompetitive posture of the United States in the worldwide market and its acknowledged need for capital expansion, compulsory licensing—which, by any other name is the core of Petitioners' suggestion—is something this country does not need.

2. Respondent Has Not Misused its Patent

Petitioners' misuse argument is a series of circular fictions, epitomized by the following statement:

> The misuse being perpetrated by Rohm and Haas is the conditioning of a license under its method patent on the purchase of propanil from Rohm and Haas. If Rohm and Haas would grant royalty-bearing licenses separately from the purchase of propanil, there would be no misuse. Such a requirement is not compulsory licensing. By its present marketing scheme, Rohm and Haas has chosen to grant licenses, but only by use of a tying arrangement. (Pt. Br. at 9)

[27] The incentive to "design around" a patent is one of the significant ways in which the patent system promotes advances in the art.

Respondent's "scheme" consists merely of selling propanil to anyone who wants it. The licenses it has supposedly "chosen" to grant to farmers are unavoidable. They are implied by operation of law in favor of purchasers in this case because propanil has no use other than in practicing the invention claimed in the patent.[28] Indeed, Petitioners expressly admit this. (Pt. Br. at 5).

Though inflammatory, Petitioner's use of the term "tying" does not withstand rational analysis. In the classic tying arrangement the linkage between the commodities which are illegally marketed together, which could and should be marketed separately, is ultimately created by the illegal actor. Here, *by operation of law, not by the acts of Respondent*, a license to use the patented process necessarily and inevitably accompanies the sale of propanil. As Petitioner's admit (Pt. Br. at 5) the licenses arise not because Respondent "chooses" to "grant" them, but because the law impresses them upon the nonstaple chemical which patentee Respondent markets.

Respondent has simply done what the law permits. It licenses those whom the law of implied licensing automatically licenses and excludes only those whom the law of infringement and contributory infringement permit to be excluded. If Respondent's "scheme" effects a "tie" at all, that tie follows as an inevitable result of 35 U.S. §§ 271(c), (d)(1), and, in any event, is not the kind of tie which should be condemned. The system adopted by Respondent is the only efficient, economic and reasonably convenient system by which a patent disclosing and claiming a new use of a nonstaple product can be meaningfully enforced by a patent owner who also wishes to sell material useful only in the patented process.

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[28] *United States* v. *Univis Lens Co.*, 316 U.S. 241, 250 (1942); also *cf.*, *Adams* v. *Burke*, 84 U.S. (17 Wall.) 453 (1873) and *Aro II*.

a. There is No Illegal Tying Arrangement

We submit that, in enacting § 271, Congress recognized, as this Court has elsewhere recognized,[29] that "tying" arrangements have at least some practical limitations and that not all licensing arrangements which might, through dogged literalism, be labelled a "tie" should automatically be condemned.[30] "Tying" purchases of a nonstaple product having no use other than that claimed in a patent, to use licenses under the patent implied by law in favor of purchasers presents none of the evils associated with typical tying arrangements. As this Court said in *Times-Picayune Pub. Co.* v. *United States*, 345 U.S. 594, 614 (1953):

> "The common core of the adjudicated unlawful tying arrangements is the forced purchase of a second distinct commodity with the desired purchase of a dominant 'tying' product, resulting in economic harm to competition in the 'tyed' market."

None of those "core" elements are present here. First, a use license which the law freely implies in favor of the purchaser of a nonstaple product is at most a very illusory

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[29] *See Times-Picayune Pub. Co.* v. *United States*, 345 U.S. 594 (1953); *United States* v. *Jerrold Electronics*, 187 F. Supp. 545 (E.D. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1961).

[30] This Court has recently cautioned that, in antitrust matters: "Literalness is overly simplistic and often overbroad," *Broadcast Music, Inc.* v. *C.B.S., Inc.*, 441 U.S. 1, 99 S.Ct. 1551, 1557 (1979), and that "departure from the rule-of-reason standard must be based upon demonstrable economic effect rather than ... upon formalistic line drawing." *Continental T.V., Inc.* v. *GTE Sylvania, Inc.*, 433 U.S. 36, 58-59 (1977), overruling *United States* v. *Arnold, Schwinn & Co.*, 388 U.S. 365 (1967). The flexible approach adopted by this Court in *GTE Sylvania* and again in *Broadcast Music* is obviously no less compelling when a party resorts to antitrust rationale in an attempt to establish patent misuse. *Cf. Automatic Radio Mfg. Co.* v. *Hazleton Res., Inc.*, 339 U.S. 827, 834 (1950).

"tying" product. Indeed, the patentee—who benefits not at all from the law's creation of that license—could avoid "granting" it only by ceasing to sell propanil, an anomalous result which would benefit no one.

Second, in the case of a nonstaple product and a use license freely implied by law in favor of purchasers of that product, there is no "second distinct commodity." Though legally distinguishable for patentability purposes, a nonstaple product and its sole meaningful use are, as a practical matter, simply inseparable. *Cf., Times-Picayune Pub. Co., supra, United States* v. *Jerrold Electronics, Inc.*, 187 F.Supp. 545 (E.D. Pa. 1960), *aff'd per curiam*, 365 U.S. 567 (1961); *Washington Gas Light Co.* v. *Virginia Electric & Power Co.*, 438 F.2d 248 (4th Cir. 1971); *International Mfg. Co.* v. *Landon, Inc.*, 336 F.2d 723 (9th Cir. 1964), *cert. denied sub nom, Jacuzzi Bros., Inc.* v. *Landon, Inc.*, 379 U.S. 988 (1965); *Kugler* v. *Aamco Auto. Transmissions, Inc.*, 337 F.Supp. 872 (D. Minn. 1971), *aff'd*, 460 F.2d 1214 (8th Cir. 1972); *compare Fortner Enterprises, Inc.* v. *United States Steel Corp.*, 394 U.S. 495 (1969).

Third, and most important, in the present instance, there can be no harm, economic or otherwise, to the market for the "tyed" product. Propanil is a nonstaple product which, by definition, has no practical use—and therefore no market—other than as disclosed in the patent in suit. Contrary to Petitioners' allegation (Pt. Br. at 9), that is not the equivalent of a patent on propanil itself. Nothing in Respondent's marketing "scheme" or in the law of infringement (contributory or otherwise) prevents anyone, including Petitioners, from making propanil, exporting it, experimenting with it, or developing new uses for it. The applicable law—and Respondent's "scheme"—simply prevent competitors from destroying the market created by industry of Respondent itself.

b. The Practical Justifications for Repondent's Conduct

Aside from the absence of any of the elements constituting the "common core" of illegality regarding typical tying arrangements, Respondent's conduct regarding its patent is fully justified by practicality and business necessity. "Use" patents are explicitly sanctioned by the patent law.[31] However, the District Court's opinion—and Petitioners' argument—would render the "exclusive rights" of the patentee with respect to a use patent highly illusory.

As Petitioners concede (Pt. Br. at 5), a person having a patent on a method of using an otherwise unusable composition and who sells that nonstaple composition necessarily grants the purchaser an implied license by operation of law. If that implied license is somehow viewed separately from the use of the composition in the only way it can be used—as claimed in the patent—then the patentee is placed in a severe dilemma. If he chooses to sell the nonstaple without licensing competitors under his patent, he may, pursuant to the District Court's analysis, be charged with patent misuse. And if he does not sell the nonstaple, he will be unable to recoup the research and development costs he bore in creating the only use the nonstaple has. Under either scenario, he will obviously have no incentive for further innovation and development.

Notwithstanding the dilemma their argument would create, Petitioners suggest five ways in which Respondent can "legitimately" exploit its method patent (Pt. Br. at 30). Those means are largely illusory. In fact, the only

[31] Under 35 U.S.C. §§ 100 (b), 101, a patent may be obtained for "a new use of a known . . . composition of matter . . . ." Once obtained, the patent can be either licensed or employed "to exclude others from . . . the invention throughout the United States. . . ." 35 U.S.C. § 154; *cf.* 35 U.S.C. § 271 (a), (d).

means suggested by Petitioners by which Respondent can exploit its patent—aside from licensing all competition at whatever may be a "reasonable royalty"—is to police use at the consumer level, either through licensing of farmers and operators of spraying equipment or through Respondent itself acquiring and operating rice farms or spraying equipment.

We respectfully submit that no conceivable purpose can be served by requiring a chemical company, as a condition to exploiting a chemical use patent, to operate a rice farm or to go into the crop spraying business.[32] We also submit that the massive policing and other practical problems necessarily attending those suggestions render them a substantial nullity. Under Petitioners' rationale, Respondent would be compelled either to license or to sue every farmer in this country who employed propanil in the manner claimed in the patent. The result, of course, would either be circuitous, duplicative and endless litigation by a manufacturer against his customers or the practical inability of a manufacturer to recoup the research and development costs he necessarily bore in developing and protecting his invention from exploitation by unlicensed users.

CONCLUSION

For the reasons set forth, LES believes that, in the proper and lawful exercise of his patent rights, the owner of a patent claiming a method of using a nonstaple

[32] As a matter of logic, Petitioners' "alternatives" necessarily concede that Respondent would not be guilty of unlawful "tying" if it: (a) entered the crop spraying or rice farm business but (b) refused to license competing sprayers or farmers. In other words, Petitioners apparently see no difficulty with what spraying concerns or rice farmers would undoubtedly characterize as unjustified projection of economic power into their markets. Petitioners simply do not want to see a chemical company, acting as a chemical company, meaningfully exploit a chemical use patent.

composition of matter having no substantial use other than claimed in the patent, should be able to sell the composition for its only known use without being compelled to license his competitors. Therefore, we urge the Court to affirm the decision of the Court of Appeals as being consistent with both the statute and constitutionally based public policy.

Respectfully submitted,

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CERTIFICATE OF SERVICE

It is hereby certified, as required by Rules 33 and 42 of this Court, that true copies of the foregoing MOTION FOR LEAVE TO FILE BRIEF AND BRIEF FOR THE LICENSING EXECUTIVES SOCIETY (U.S.A.), INC., AS *AMICUS CURIAE*, with Attachment, were served by first class mail, adequate postage affixed, upon

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ATTACHMENT A

96th Congress
1st Session

COMMITTEE PRINT

NATIONAL STRATEGY FOR TECHNOLOGICAL INNOVATION

PREPARED AT THE REQUEST OF

HON. HOWARD W. CANNON, *Chairman*

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

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LETTER OF TRANSMITTAL

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION,
October 15, 1979.

DEAR COLLEAGUE: The Committee on Commerce, Science, and Transportation has conducted oversight hearings on the state of U.S. industrial technology and innovation, and has a continuing interest in national policy with respect to innovation. The Committee is concerned with the need to stimulate technological and industrial innovation to increase productivity, strengthen America's competitive position in world markets, and contribute to the overall vitality of the U.S. economy.

As part of the Committee's interest in examining various legislative proposals dealing with innovation, Senators Ernest F. Hollings, Adlai E. Stevenson, and I requested that a study conducted by Mr. Ellis R. Mottur, Guest Scholar at the Woodrow Wilson International Center for Scholars, be made available to the Committee. This document contains the report prepared by Mr. Mottur, including the outlines of an omnibus bill.

Although this report has not been considered or endorsed by the Committee or any of its members, I believe it will be of interest to many persons in Government, industry, labor, academia, and the general public. To insure its general availability, I have asked that this document be published as a Committee print.

Sincerely,

HOWARD W. CANNON,
Chairman.

SUMMARY AND CONCLUSION

SUMMARY

Technology innovation is the key to conquering our present calamities and discovering future treasures. Without it, we are forever consigned to carving up the same old pie in smaller and smaller slivers. With it, we can expand the real wealth of the pie to provide larger portions for all. This report sets forth a national strategy for stimulating technological innovation.

It establishes the enormous importance of innovation to our economy and national well-being, and underscores the fact that U.S. innovation is lagging compared to foreign competitors and our inherent potential. It delineates the elements necessary to successful innovation and describes the reasons why it is currently lagging. The report then enunciates the policies needed to stimulate innovation, and sets forth specific legislative proposals to implement them. Each section of the report is summarized below.

SIGNIFICANCE OF INNOVATION

The importance of innovation is enormous. It is a key factor in assuring national security, economic vitality, and domestic problem solving. It is essential to increasing productivity; reducing inflation and achieving full employment; meeting international economic competition; developing alternative energy sources and improved methods of conservation; solving environmental problems; providing effective public services in cities and counties; generating the national wealth required to pay for necessary social services; and in general enhancing the quality of life in our country.

U.S. INNOVATION LAGGING

Despite America's impressive past record, innovation in the United States is currently lagging as compared with its challenges, competitors, and potential. Thus, in recent years U.S. capital investment in innovative activities has fallen short; for example, the capital obtained from public offerings by small firms dropped from $1.46 billion in 1969 to $16.2 million in 1975! Investment in R. & D. has stagnated: Federal funds for R. & D. in 1979 were 16 percent less than what they had been 12 years earlier; at the same time that Japan and West Germany recorded substantial growth in the proportion of their GNP going to R. & D. Similiarly, the proportion of scientists and engineers in the U.S. population has dropped since 1969, while it has shown an increase in most other advanced nations. America has shown a decline in its patent balance of 47 percent in recent years, and currently has a negative balance with Japan and West Germany. For the past 20 years U.S. productivity growth has been substantially below that of its

foreign competitors: between 1960 and 1976, Japanese productivity gained 5 times more rapidly than America's; and during the most recent quarter of 1979, U.S. productivity fell more precipitously than at any time since we began keeping records in 1947. It is not surprising, therefore, that—even in technology-intensive items—we now have a negative trade balance with Japan; and the traditional U.S. surplus in manufactured goods was transformed into a $3 billion deficit in the first quarter of last year. Along with these distressing economic indicators, stands our failure to produce the innovations necessary to meet our compelling national needs in fields such as energy, environment, and transportation.

NATURE OF THE INNOVATIVE PROCESS

To recognize the causes and devise remedies for our recent decline, we must first elucidate the nature of innovation and the elements required for its success. Innovation is more than an invention or technological development. It is the introduction, sale, or use of a new technology—whether product, process, or system—in the consumer or industrial marketplace or public arena. Thus, innovation encompasses the entire spectrum of research, development, invention, engineering, finance, marketing, production, management, and sales. For an innovation to succeed, it must embody the following elements:

(1) The imaginative matching of potential technologies with economic and social needs and opportunities;

(2) Strong leadership on the part of an individual who makes the sustained commitment to persist in pushing the innovation forward:

(3) The possibility of tapping or stimulating sufficient market demand so that the innovation can reach the scale or volume necessary for success;

(4) Individuals or firms, with access to sufficient capital, who are willing and able to take the risks and invest the time, money, and human energy to shape the potential technology to meet the particular market demand:

(5) A combination of potential rewards and risks, along with an expected probability of success, which is attractive enough to justify investment of the necessary capital, when compared with alternative uses to which it could be put:

(6) High caliber management skills to move the innovation successfully through engineering, production, marketing, distribution, and sale; and

(7) Sufficient time and continuing availability of resources to allow the innovation to prove itself out before the final reckoning of success or failure.

To assure that the innovative well does not run dry, the foregoing elements in the innovative process must be solidly grounded in:

(8) An ever-expanding reservoir of scientific knowledge, arising from the unfettered course of basic research and the directed currents of applied research aimed at the needs of the society at large, as well as the special requirements of particular industries;

(9) An abundant supply of highly qualified scientists, engineers, and managers capable of moving the innovations ahead, with the intellectual flexibility and caliber to cope with constant advances in science and technology and a high degree of career mobility to redeploy their talents among academic, industry, and government organizations to meet shifting problems and priorities; and

(10) Sufficient high quality facilities, equipment, and instrumentation for conducting the necessary research, development, and engineering.

CAUSES OF RECENT DECLINE

The recent decline in U.S. innovation is caused by certain conditions prevalent in the overall economy and by a number of shortcomings within the innovative system itself. The principal external conditions which serve to impede innovation include: (a) the high rate of inflation which militates against the kind of long term, risky investments which are required for innovation; (b) the low rate of capital formation in our economy which limits the amount of capital available for investment in innovative ventures, (c) the burgeoning of Government regulations in recent years that slow the innovative process and focus management and technical talent on compliance rather than creation; and (d) the high rate of unemployment which reduces consumer purchasing power and thereby limits the potential consumer markets for innovation. The internal shortcomings in the innovative system include the following elements:

(1) Basic research—which can thrive only in an atmosphere of free inquiry and which requires long-term stability and continuity of support—is too much influenced by the inroads of inflation, the fluctuations of the annual appropriations process, and constantly shifting political currents and fads;

(2) Insufficient educational emphasis on pragmatic problem-solving for those engineers who will be working in industry; and inadequate continuing education and career planning, flexibility, and mobilty for scientists and engineers in general;

(3) Inadequate facilities, equipment, and instrumentation for university-based R. & D., along with difficulties of financing plant and equipment for small business technology firms;

(4) A deficient patent system which: (a) Offers inadequate incentives to induce the risks necessary to bring innovations into the marketplace; (b) provides insufficient stimulus to match potential technologies with economic and social needs and opportunities; (c) contains too many Government held patents which are rarely commercialized; (d) is too narrow in scope to reflect the latest advances in science and technology; (e) maintains an antiquated operation that does not provide timely or legally reliable patents; (f) results in excessive patent litigation that is time-consuming, costly, and riddled with inconsistencies and uncertainties; and (g) sometimes even serves to inhibit innovation;

(5) Not enough applied research on generic problems common to particular industries or industrial processes, such as the steel industry or computer-aided manufacturing;

(6) A lack of institutions to stimulate the design, development, and demonstration of major systems involving advanced technologies in priority national areas such as alternative energy sources, energy conservation, automated mass transit, pollution controls, and toxic waste disposal;

(7) The inability to generate strong, sustained large-scale market demand for public technology systems;

(8) Inadequate sources of venture capital and insufficient incentives and aids to small business technology firms in carrying out innovation and competing with larger established enterprises, despite the overwhelming evidence of small business' disproportionately large contribution to innovation in America;

(9) Lack of planning and provisions to aid communities and workers in averting or adjusting to major economic dislocations due to technological innovation;

(10) Insufficient technical and financial aid to small-scale, community technology projects, despite the spreading interest in this approach throughout the country and the relatively small Federal investment that would be entailed; and

(11) No central, high-level focal point for guiding and coordinating the innovation policies and programs of the Federal Government.

NATIONAL STRATEGY

Solutions to the external, macroeconomic impediments to innovation—such as inflation and inadequate capital formation—lie beyond the scope of this study. Similarly, the inhibiting effect of excessive regulation requires a major overhaul of the regulatory structure which encompasses a far wider range of considerations than that of the impact on innovation; accordingly, this issue deserves separate treatment and probably requires major legislation of its own.

The specific recommendations of this report are devoted entirely to removing the internal impediments to innovation or—stated more positively—to strengthening the innovative infrastructure and incentive system. They are designed primarily to impel the private sector to create the innovations of which it alone is capable: by shoring up market demand, and providing a panapoly of incentives to stimulate corporate and individual commitment to innovative action.

But although it is the private sector which ultimately must produce the innovations, it is government action—or inaction—which shapes the framework of institutions, laws, regulations, and incentives which, in the final analysis, serves to stifle or to spur innovation.

In designing a strategy whereby Government can stimulate innovation in the private sector, we must recognize at the outset that there are no quick fixes or simple prescriptions to follow. Since innovation encompasses the full spectrum of activities from basic research through development, invention, additional engineering, finance, production, marketing, distribution, and use in society—any strategy that will prove effective must impact on key elements throughout the entire process. Otherwise isolated improvements at particular points in the system may result in little or no overall effect on innovation.

CONCLUSION

As stated at the outset, innovation is the key to conquering our present calamities and discovering future treasures. From Thomas Jefferson's inventions at Monticello to the astronauts' landing on the Moon, innovation has always been an integral aspect of the American scene, imparting a powerful impetus to our prosperity and way of life.

Only in the last decade have we begun to lag, as others have accelerated their competition and experimented with new institutional arrangements for fostering innovation. But our underlying innovative capabilities remain solid and strong. Our scientists and engineers represent a magnificent resource of creative ability. Our entrepreneurs and business managers are as enterprising and imaginative as ever. The problem lies not with our people, but with our policies and procedures. The innovative infrastructure has become too bureaucratical, and the economic system is not sending out the sort of signals calculated to encourage investment in the future.

Through the proposed legislation, we cannot expect to transform the economic climate overnight. But we can refashion the infrastructure so that it spurs rather than stifles innovation. Because of its many facets and interrelations, the proposed bill may seem extremely complicated. But its central message is clear and simple:

(1) Innovation can come only from the private sector; the Government's role is to stimulate not supplant private initiatives.

(2) Innovation principally responds to market demands. The Nation's pressing needs for improved public technology systems in such fields as energy, transportation, and waste recycling can be met only through the aggregation of sufficient market demand to elicit the requisite technology. The Government's role is to provide tehnical assistance and matching funds to augment local market demand and to aid in the development and demonstration of advanced technology systems which would not otherwise be launched. The Government must also use its extensive procurement power to stimulate private market demand for desirable innovations in such fields as solar home heating and cooling.

(3) Even more important, the Government should stimulate a vast new marketplace of innovative ideas by reshaping the patent system to expand its scope and force the public auction of innovative ideas when they are not being effectively pursued. Combined with the computerization of the Patent Office and a special innovation tax of only 10 percent on the sale of patents (in lieu of all other taxes), these measures will enable patents to achieve their full potential and become the principal propulsive force for innovation in our economy.

(4) Small business technology firms must also be empowered to realize their full potential in the innovative process through greater access to venture capital and Federal procurement contracts; technical, managerial, and regulatory assistance; and tax incentives to impel them to take the risks necessary to prove innovations out.

(5) Larger technology firms need to be stimulated to make the necessary investments through accelerated depreciation of the facilities and equipment used in innovation.

(6) Finally, the growing grassroots movement for the appropriate use of small-scale, community-based technology should be aided by matching Federal funds and technical assistance; and communities and workers who might be adversely affected by innovation should be aided by community and worker adjustment programs.

In short, innovation only happens when someone puts himself on the line to make it happen. This inevitably entails risks. Few will take such risks unless there is promise of ample market demand and sufficient incentives to make the risks appear worth taking. The policies and programs set forth in this report are aimed at stimulating individuals throughout the private sector to take such risks.

To accomplish this purpose, the model legislation includes a number of new institutions and policy mechanism. Admittedly it is not very popular at present to propose the establishment of new institutions. But it is only by imaginative innovation in the institutional infrastructure itself, that we can unleash the floodgates of innovation throughout our economy and society at large.

It is hoped that this report, the body of which is presented below, will contribute to informed public debate on these issues.

PART I—ANALYSIS

Significance of Technological Innovation

In the midst of the energy crisis, double digit inflation, the deepening recession, and the President's "crisis of confidence," it may be asked why should one worry about innovation? Aren't there enough more pressing problems to contend with at this time?

But it is the very presence of those other problems which underscores and lends urgency to the innovation issue. For if we had paid sufficient attention to innovation in the past, we wouldn't be in such difficult straits today. If, for example, after the Second World War we had accorded the same priority to solar energy research that we did to nuclear power—with the same level of financial investment and technical talent—who could doubt that we would be in a position to meet a significant proportion of our energy needs today through solar power? Yet as late as 1969, the total solar research budget of the National Science Foundation was under $1 million, and efforts by the Congress to raise that amount were met with impoundments by the President.

Similarly, in the mid-1960's, a report commissioned by the President's science adviser forecast a major energy shortage in the future, but the Nation's attention was on Vietnam and the Great Society programs, and no one had time to plan for the problems of the future.

And even after the shock of the Arab oil embargo in 1973, when the handwriting on the wall was clear for all who had eyes to see, there was no mobilizing of the Nation's R. & D. resources to advance alternative energy sources, nor any marshalling of political machinery to promote massive conservation of energy.

Moreover, the overriding need for public transportation systems was apparent to those who forecast energy supply and demand as early as the mid-1960's, yet transit R. & D. has never received the all-out national commitment of resources which was required; and subsidies for roadbuilding continued in high gear, while matching funds for mass transit were always suffering from ignition problems and stalling.

So while steps to strengthen the Nation's innovation system may not lead to immediate solution of our current problems, they are essential to help avert similar problems in the future. It should be recognized that the initial thrusts toward innovation must oftentimes be taken before the economics are established as favorable for the new technology. Thus, in the past it had frequently been asserted that solar power and coal liquefication or gasification are not competitive with oil and, therefore, we shouldn't proceed with them. But it is only through continuing R. & D. and innovation that we can make these alternatives competitive in the future.

Ideally, R. & D. programs should be initiated long before their results are required. They should not have to be launched in reaction to present problems (as with the current synfuel proposal), but rather in anticipation of future problems. Thus, they should be started early enough so that the results are ready by the time the needs are upon us. Innovation is a time-consuming process which demands foresight and courage to commit resources before the final balance sheets can be drawn.

In effect, innovation is the cutting edge of our trajectory into the future. As planetary probes explore the reaches of outer space, so innovative technologies extend our reach into the future and create new options for shaping life in the world of tomorrow.

The impact of innovation—or the lack thereof—on our social-economic system is both profound and pervasive. Thus, "advances in knowledge have been the biggest single factor in economic growth and productivity gains in the United States over the past four decades." Moreover, "The rate of return on investments in R. & D. is generally high * * *. Private rates of return for innovations (are) generally in the 25-percent to 30-percent range * * * (and) public or social rates of return have been calculated to be * * * over 50 percent * * *. High-technology, R. & D. intensive industries have made an especially strong contribution to the economy * * *. These industries have on the average increased output, productivity, and employment several times as fast as low-technology industries, while raising their prices much less." [1]

In the words of the Comptroller General of the United States, the Honorable Elmer Staats: "technological innovation was responsible for 45 percent of the Nation's economic growth from 1929 to 1969. When high and low technology industries are compared, high technology firms have productivity rates twice as high, real growth rates three times as great, one-sixth of the annual price increases, and nine times the employment growth." [2]

Technological innovation, then, is clearly essential to increasing productivity and to the continuing creation of new products and industries. Its impact on inflation is equally great; indeed, there can be no lasting solution to the problem of inflation without a significant upsurge in innovation. For without innovation, productivity cannot be significantly improved, and without such an improvement in productivity, inflation will continue to run rampant regardless of palliatives like the wage-price guidelines. Thus, while steps to enhance innovation may have little immediate impact on inflation, they are essential in any sustained, longrun solution to the problem.

On the whole, innovation also contributes to the generation of jobs. It is true, of course, that specific innovations sometimes eliminate the need for certain jobs and result in increased unemployment in particular localities. But the overall impact of innovation is to generate new products, industries, and jobs. Moreover, the effect of innovation on

[1] American Association for the Advancement of Science, "Research and Development, AAAS Report III. R. & D. in the Federal Budget: Fiscal year 1979. R. & D., Industry, and the Economy." Prepared by Willis H. Shapley and Don I. Phillips, Washington, D.C., 1978, pp. 77–78.

[2] National Academy of Sciences, "Technological Innovation and the U.S. Economy." Washington, D.C., Nov. 14, 1978, p. 47.

productivity also helps generate jobs: According to Prof. Richard R. Nelson of Yale University, "More rapid technical advance and productivity growth, far from being a threat to employment, would facilitate a reduction in unemployment * * *. The proximate source of today's high unemployment is restrictive Government policies. If more rapid productivity growth can facilitate better control of inflationary pressures, governments will be able to relax their restraints. Far from being a threat to employment, more rapid productivity growth may be a prerequistite for a return to higher levels of employment." [3]

Furthermore, a study by the MIT Development Foundation showed that the average compounded annual growth in jobs for a sample of young high-technology companies, from 1969 to 1974, was 41 percent; whereas a sample of mature companies over the same period showed less than 1 percent growth in jobs. The study, which contrasted job growth for mature companies with innovative companies and with young high-technology companies, showed that:

> During the 5-year period the six mature companies with combined sales of $36 billion in 1974 experienced a net gain of only 25,000 jobs, whereas the five young, high-technology companies with combined sales of only $857 million had a net increase in employment of almost 35,000 jobs. The five innovative companies with combined sales of $21 billion during the same period created 106,000 net jobs.[4]

Innovation is also central to the United States' international economic competitive position.

> The U.S. trade balance for R. & D. intensive manufactured products has been positive and rising since 1960: the 1976 balance was five times that of 1960 and two and a half times the 1970 level.[5]

Thus,

> the trade balance for research and development-intensive manufactured products * * * is now over $28 billion. The trade balance for nonresearch and development-intensive products is down from a breakeven level in 1960 to a $16 billion deficit.[6]
>
> Clearly the technology-intensive product group has been responsible for yielding surpluses and largely covering deficits in trade from specific non-R. & D.-intensive product groups * * *. Its importance in maintaining an overall favorable trade balance is unquestionable.[7]

Thus it is innovation-engendered technology which has made for a favorable trade balance in recent decades, and which is essential to regaining a favorable balance in the future. The importance of foreign trade to the overall U.S. economy is seen from the fact that "the United States remains the world's largest exporter as well as its biggest importer." According to Hon. C. Fred Bergsten, Assistant Secretary of the Treasury for International Affairs:

> One out of every five jobs in this country now produces for exports to other countries. One out of three dollars of corporate profit in this country derives from international activities of American firms.[8]

[3] Richard R. Nelson, "Technical Advance and Economic Growth: Present Problems and Policy Issues," in Proceeding of the International Conference on Science and Technology at New York University, March 1979. New York Academy of Sciences, New York.

[4] American Association for the Advancement of Science, "R. & D. in the Federal Budget, R. & D., Industry, and the Economy." AAAS Report No. 78–R–3, September 1978, Washington, D.C., pp. 132–33.

[5] National Science Board, National Science Foundation, "Science Indicators 1976". Washington, D.C. 1977, p. 3.

[6] NAS, "Technological Innovation and the U.S. Economy," p. 47.

[7] NSB, "Science Indicators" 1976, pp. 37–38.

[8] Helen Dewar, "The Impact of Exports and Imports," in the Washington Post, Washington, D.C., July 17, 1978, p. A22.

Essential as it is to maintaining a strong economy at home and competitive position abroad, innovation is equally important to meeting many of our pressing national needs. Thus technological innovation is required in order to develop: (1) Alternative energy sources such as solar, wind, geothermal, ocean thermal, coal liquification and gasification, and fusion power; (2) solutions to environmental problems such as air and water pollution and toxic waste disposal; (3) means for providing effective public services at reasonable costs in fields such as transportation, communications, fire fighting, public safety, and home utilities; and (4) effective defense and arms control technology to promote national security.

In a more fundamental sense, innovation may be seen as central to the generation of wealth in our society. First described by Fritz Machlup in "The Production and Distribution of Knowledge in the United States" [9] and by Daniel Bell in "The Coming of Post Industrial Society" [10], it is now generally recognized that we live in a knowledge society where the basic commodity is information. In such a society the most valuable information of all is the knowledge capacity to innovate. This capacity, rather than natural resources or industrial plant and equipment, becomes the key to generating new wealth. Therefore, if over the long haul we want to be able to afford to provide our citizens with necessary social services such as welfare, health care, and social security, we must foster sustained technological innovation throughout our economy.

In short, the significance of innovation is enormous. It is a key factor in insuring national security, the vitality of the economy, and fulfillment of our social needs. Specifically, it is essential to productivity; the creation of new products and industries; reducing inflation; achieving full employment; meeting international economic competition; developing alternative energy sources and improved methods of conservation; solving environmental problems; providing effective public services; generating the national wealth required to pay for neccessary social services; and in general enhancing the quality of life in our country.

U.S. Innovation Lagging

Despite America's impressive record of innovation over the past century, the consensus of informed judgment today is that U.S. innovation is lagging; as compared with its past, its potential, its current challenges, and its foreign competitors. The past year has witnessed a spate of articles on innovation, not only in the business and technical press, but in the popular media as well. The burden of these articles has been uniformly negative: That we are not innovating as rapidly and effectively as necessary to spur economic vitality and meet foreign competition. For example, the cover of a weekly newsmagazine was recently devoted entirely to innovation. The headline read: "Innovation—Has America Lost Its Edge?" The remainder of the cover consisted of a cartoon which attempted to convey the lack-

[9] Fritz Machlup, "The Production and Distribution of Knowledge in the United States". Princeton: Princeton University Press, 1962.
[10] Daniel Bell, "The Coming of Post Industrial Society". New York: Basic Books, 1973.

adaisical pace of U.S. innovation.[11] Similar articles laced the business, technical, and popular press throughout the year.

At the same time a salvo of policy studies on innovation was launched by Government and business groups, along with a steady supporting fire of speeches on the topic by leaders of industry and the technical community. Thus, three of four congressional analytical arms have undertaken major studies of innovation: The General Accounting Office (GAO), the Congressional Research Service (CRS), and the Office of Technology Assessment (OTA). The prestigious business policy analysis organization, the Committee for Economic Development (CED) is carrying out a major study on innovation. But the most extensive effort is the administration's Domestic Policy Review of Innovation, chaired by the Secretary of Commerce and involving inputs from all affected Government departments and agencies, as well as from a large number of outside advisory panelists. The outside inputs were in the form of separate reports from special subcommittees on: Economic and Trade Policy; Regulation of Industry Structure and Competition; Patent Policy; Federal Procurement Policy; Environment, Health, and Safety Regulations; Direct Support of Research and Development; and statements from the Labor Advisory Subcommittee and the Public Interest Advisory Subcommittee. Throughout these reports

> there was general agreement * * * that American productivity is lagging, particularly in comparison with major competitors such as Japan and West Germany. The decline in the growth rate of productivity * * * is regarded as a major factor contributing to inflation and the decline of the dollar.[12]

And the reports underscored the link between innovation and productivity.

In short, there is a strong consensus of opinion that innovation in the United States is lagging. To the extent that relevant data are available, they all support this conclusion. Such data deal with the inputs or resources made available for the innovation process in the United States, the outputs from the process, the effects of innovation on the economy, and comparisons with foreign nations. Relevant data from these areas are summarized below.

A key input to the innovation process is capital investment. This is, of course, critical in all business activity, but it is especially significant in innovative undertakings, which frequently involve the development of ancillary instrumentation and techniques, as well as the introduction of new facilities and equipment. In his major study of the relationship between inventions and economic acticity, Jacob Schmookler showed that capital investment was a necessary precondition of inventive activity, or at least that capital investment and the market demands associated with such investment preceded the development of inventions.[13] However, the investment which precedes an invention is only the tip of the iceberg; for "90 percent of the investment necessary to bring innovation successfully to market comes after the inven-

[11] "Innovation: Has America Lots Its Edge?" in Newsweek, June 4, 1979, cover page and pp. 58–68.
[12] John Walsh, "What Can Government Do For Innovation?" in "Science". Washington: American Association for the Advancement of Science, p. 350.
[13] Jacob Schmookler, "Invention and Economic Growth". Cambridge, Massachusetts: Harvard University Press, 1966.

tion process is complete." [14] In short, significant continuing capital investment is an essential prerequisite for healthy innovative activity.

But in recent years capital investment in innovative activities has fallen short of what is needed. This is partially due to the pervasive climate of uncertainty which has cloaked business decisionmaking in our society over the past decade. As long as the overall economic situation is uncertain, businessmen find it more difficult to make long-term commitments of capital. This is greatly exacerbated by the rampant inflation which has "meant that the cost of capital has reached all time highs, acting as a deterrent to capital spending," and which "has drastically altered the rates of return for new investments that businesses can accept. Faster recovery of capital costs has become a watchword in investment decisions by business, with an eye on the importance of profitability over the short term." [15] This is particularly important with respect to investment decisions on innovation, since innovations typically take long time periods to reach fruition. "It is rare that an important innovation can have a major impact short of 4 or 5 years, and, more frequently, the impact of a major innovation may not be felt for a decade or two." [16]

The problem is underscored by considering "the recycling time of risk capital for entrepreneurial types of investments," as noted by James Hillier the former Executive Vice President of RCA Corporation:

> If you invested in a standard innovation, say, in the mid-sixties, you could expect to get back your purchasing power so that you could recycle it into another innovation in about seven to nine years. For exactly the same innovation under today's conditions, it takes fourteen to fifteen years to recoup the original purchasing power. This means that we have to use twice as many constant dollars, twice as much purchasing power to achieve the same number of innovations today as it would have taken fifteen years ago.[17]

In any event, capital investment for innovation has fallen short over the past decade. "Capital expenditures by American businesses expanded by an average of 3.8 percent per year in real terms (from 1945 to 1970), but by only 0.9 per year since then.[18] Concurrently, "from 1969 to 1975, the total number of companies seeking equity funds for growth dropped 92 percent—from 1,800 to 150.[19] The capital acquired by firms with less than $5 million in net worth from public offerings since 1969 dropped from $1.46 billion in 1969 (with 548 offerings) to $16.2 million in 1975 (with 4 offerings)! The catastrophic decline in capital obtained by small businesses * * * extends to other sources of small business financing, including professional managed venture capital sources and high-risk investments by individuals." [20] "A recent survey by the American Electronics Association (AEA) documents

[14] Final Report of the Subcommittee on Economic and Trade Policy of the Advisory Committee on Federal Policy on Industrial Innovation to the Secretary of Commerce. Washington, Feb. 15, 1979, p. 6.
[15] *Ibid.*, pp. 5–6.
[16] Final Report of the Subcommittee on Procurement and Direct Support of Research and Development of the Advisory Committee on Federal Policy on Industrial Innovation to the Secretary of Commerce, entitled "Federal Procurement Policy." Washington, January 26, 1979, p. 2.
[17] NAS, *Technological Innovation and the U.S. Economy*, p. 57.
[18] Report of Subcommittee on Economic and Trade Policy, p. 6.
[19] Report of Subcommittee on Procurement, p. 17.
[20] Final Report on Patent Policy of the Subcommittee on Patent and Information Policy of the Advisory Committee on Federal Policy on Industrial Innovation to the Secretary of Commerce, Washington, February 6, 1979, pp. 1–2.

the increasing difficulty that new, small companies are having in gaining access to capital markets. Of the firms they studied: Companies founded between 1971 and 1975 were able to raise only half as much equity capital, on the average, as firms founded between 1966 and 1970; and firms founded in the more recent period had an average debt to equity ratio of more than 2:1, compared to the more secure 1:1 ratio that had prevailed for the previous fifteen years. * * * For the small businessman, the availability of capital has become the greatest unaddressed problem." [21] The significant of this shortage of capital for small business is underscored by the finding that small firms produce proportionately more innovations than do larger firms.[22]

Another striking indication of the decline the capital investment in innovative activities is the fact that: "as recently as 1968, 300 to 400 high technology firms were founded. But in 1976 the number was zero." [23]

Along with capital investment, the key indicators for input to innovation derive from specific statistics on the allocation of financial and human resources to R. & D. activity; for R. & D. is the underpinning of innovation. R. & D. by itself will not automatically produce or guarantee innovation; but without the reservoir of knowledge which derives and is replenished from R. & D., sustained innovation is unlikely. "All available evidence indicates that R. & D. is an important contributor to economic growth and productivity * * * the contribution of R. & D. to economic growth/productivity is positive, significant, and high," [24]

But resources for R. & D. over the past decade have lagged considerably. Thus "total (Federal) funds budgeted for fiscal year 1979 for the conduct of R. & D. * * * in constant dollar terms (are) * * * actually 16 percent below fiscal year 1967." [25] "As a fraction of the Gross National Product (GNP), national R. & D. spending has dropped from the high of 2.97 percent reached in 1964, falling to an estimated 2.25 percent in 1976 * * *. (In constant dollars) Federally supported R. & D. expenditures * * * in 1976 (were 18 percent below the peak reached in 1967. * * * As a fraction of the total Federal budget, R. & D. funds have declined substantially, falling, to an estimated 6 percent in 1976 from a high or 13 percent in 1965. As a fraction of the "relatively controllable" portion of the Federal budget, R. & D. outlays amounted to 13.5 percent in 1976—the lowest level since 1967 when they were 16.3 percent.[26]

With respect to basic research (which comprises about 13 percent of all R. & D. spending), "national spending * * * in constant dollars * * * in 1976 * * * remained nearly 11 percent below the peak year of 1968 * * *. In constant dollars, estimated Federal and Industrial support for basic research in 1976 was 15 percent below the peak levels which each had reached in 1968 * * *. In 1976 basic research expenditures by universities and colleges (in constant dollars) * * * were

[21] Report of the Subcommittee on Economic and Trade Policy, pp. 3–4.
[22] "Technological Innovation: Its Environment and Management." U.S. Department of Commerce. Washington. January 1967, pp. 16–18.
[23] NAS, "Technological Innovation and the U.S. Economy," p. 48.
[24] "A Review of the Relationship between Research and Development and Economic Growth/Productivity." Washington, National Science Foundation, February 1971, p. 3.
[25] AAAS Report III, p. 14.
[26] NSB, "Science Indicators 1976", p. 44.

roughly equal to the level reached in 1969 * * *. In constant dollars, Federal spending for academic basic research peaked in 1968, but real dollar expenditures for 1976 remained an estimated 10 percent below that peak year." [27]

With respect to industrial R. & D., "total funding for industrial R. & D. has barely kept up with inflation for the last 10 years. Increases in private industry funding of R. & D. have largely been offset by decreases in Federal funding of industrial R. & D. * * *. We see some signs of our decline in that the average constant dollar investment in R. & D. by industry has increased by less than two-tenths of a percent per year from 1967 to 1977." [28] Moreover, "there has been recent evidence * * * of a shrinking of time horizons and a growing conservatism regarding industrial R. & D." [29] "There has been an increased private-sector R. & D. emphasis in recent years on low-risk, short term projects directed at incremental product changes, and a decreased emphasis in the longer term research that could lead to radically improved products and processes." [30]

With respect to human resources, "in 1975, approximately 531,000 scientists and engineers (on a full-time equivalent basis) were engaged in R. & D. * * * almost 28,000 fewer than the peak employment level reached in 1969 * * *. The number of R. & D. scientists and engineers in industry * * * reached almost 360,000 * * * in 1975, (but) was still nearly 7 percent less than the peak employment reached in 1969." A particularly disquieting aspect of the human resources situation is the fact that there has been an aging of the academic workforce. Thus "of all the doctoral faculty involved in R. & D., the proportion of young science and engineering investigators decreased from 44 percent in 1968 to 30 percent in 1974." [31]

Another important indicator of inputs to innovation are Federal funds provided for the dissemination of scientific and technical information. For innovation cannot occur if the results of R. & D. are not incorporated in technology and used in the economy and the society at large. This process is facilitated through the dissemination of scientific and technical information. Thus it is disquieting to note that "Federal obligations for the dissemination of scientific and technical information, measured in real dollars, peaked in 1968 at $435 million but fell to an estimated $321 million in 1976." [32]

Thus far we have considered data reflecting inputs to the process of innovation, or resources made available to R. & D. and innovation activities. Now we shall turn to those data relating to outputs of the process, its effect on the economy, and comparisons with foreign nations.

Although the current scope of patents is such that they do not adequately reflect the full range of innovation occurring in our economy, they nevertheless provide one of the best indicators available for gaging the extent of inventive activity which is taking place. The

[27] Ibid., p. 66.
[28] Industrial Innovation and Its Relation to the U.S. Domestic Economy and International Trade Competitiveness. Washington, Congressional Research Service Report No. 78-204 SPR. October 13, 1978, p. 7.
[29] Nelson, p. 9.
[30] CRS Report No. 78-204 SPR, p. 14.
[31] NSB, Science Indicators 1976, p. 130.
[32] Ibid., p. 45.

data on patents is not reassuring. Thus, "the total number of patents issued annually has declined since 1971." [33] At the same time, "although positive, the U.S. patent balance declined almost 47 percent between 1966 and 1975. This was due to the 91-percent increase of foreign-origin patenting, coupled with the leveling off and eventual decline in the number of foreign patents awarded to U.S. citizens. The United States has a favorable but declining patent balance with Canada, the United Kingdom, and five European Economic Community countries, but a negative balance with West Germany and Japan. The share of U.S. patents granted to foreign residents has more than doubled in the last 15 years, reaching a level of more than 35 percent in 1975 * * *. The percent of patents due to foreign inventors increased in nearly every product field from 1965 to 1975." [34] "In the 1950's, according to an analysis by the Stanford Research Institute, 82 percent of the major inventions brought to market were developed in the United States. By the late 1960's, the figure had declined to 55 percent." [35]

Perhaps the most important indicator of the extent and effectiveness of innovation consists of data relating to productivity gains. For although productivity gains are generated by other factors besides technical change (such as increased skills in the work force and improved organization of production); and although technological innovation not only enhances productivity, but also can lead to new goods and services—nevertheless, the date of productivity growth is as good an indicator of the extent and quality of innovation in our economy as we have available.

It is, therefore, distressing to note that "productivity gains * * * have averaged only 1.6 percent during the last decade, a discouragingly low figure compared to the 3.2 percent average for the first two decades in the postwar period (and) compared to the 5 and 6 percent figures of our major trading partners * * *. If productivity over the last 10 years had increased at the same 3.2-percent annual rate of growth of the two previous decades, then output per hour would have been 11-percent higher in 1977. The difference would have meant more than a $100 billion increase in terms of real gross national product at the 1977 employment level." [36] It is disturbing not only that productivity growth is substantially less than it had been in past decades, but that it is significantly lower than that of our trading partners. "Economists generally agree that the rate of productivity growth in the American economy has been substantially below that of America's major foreign competitors." [37]

Thus, while U.S. productivity grew 2.8 percent from 1960 to 1970, during the same period productivity grew 3.3 percent in the United Kingdom, 3.7 percent in Canada, 5.5 percent in West Germany, 5.9 percent in France, 7.4 percent in Italy, and 10.8 percent in Japan.

Productivity levels in the United States (currently) exceed those of France, West Germany, and the United Kingdom, but U.S. productivity gains between 1960 and 1976 were the smallest of the five countries. Japanese productivity gains

[33] Report on Patent Policy, p. 2.
[34] NSB, "Science Indicators 1976," pp. 2, 3, 92.
[35] Newsweek, p. 58.
[36] NAS, "Technological Innovation", p. 45.
[37] Robert Gilpin, "Technology, Economic Growth, and International Competitiveness", a report to the Joint Economic Committee, U.S. Congress. Washington, July 9, 1975, p. 10.

were more than five times greater than U.S. increases.[38] Finally, productivity of U.S. businesses fell more rapidly in the second quarter of this year (1979) than at any time since the Government began keeping records in 1947.[39]

This disappointing record of U.S. productivity growth is a clear indication that U.S. innovation is not achieving all that one could reasonably expect of it.

Comparison with foreign nations along other dimensions serves to underscore the overall impression that U.S. innovation is lagging. For example, since 1964, the proportion of the gross national product devoted to R. & D. in the United States has substantially decreased; whereas "during the decade 1962–72, both Japan and West Germany recorded substantial growth in the proportion of their gross national product directed toward R. & D." [40] Although West Germany has recently leveled off and started to decline in its ratio of R. & D. expenditures of gross national product, Japan is still continuing to increase.

Another comparative measure of a country's R. & D. effort is the relationship between the number of scientists and engineers (S. & E.'s) and the population. The number of S. & E.'s per 10,000 population in the United States has remained constant since 1972. The 1975 level is 10 percent lower than that of 1969, when this ratio peaked in the United States . . . (but) data from the other countries studied showed a general increase in this ratio.[41]

While the U.S. trade balance for R. & D.-intensive manufactured products has been positive since 1960 and while surpluses from these product groups, until 1976, have been sufficient to cover the increasing deficits from non-R. & D. intensive products, nevertheless the situation is shifting to a less favorable stance for the United States. Thus, the United States now has a "negative trade balance in R. & D. intensive products with Japan * * * due mainly to U.S. imports of electrical machinery and to a lesser degree to imports of professional and scientific instruments and nonelectrical machinery." [42] In 1977, this amounted to "a $3.6 billion trade deficit with Japan in high-technology goods * * * about two-thirds of (which) was accounted for by imports of consumer electronic goods." [43] Even more foreboding is the fact that the newest bridge across the Mississippi River "is soon to be fabricated in Japan at a cost of $42 million, one-third less than the lowest American bid, and floated by barge in pieces the size of ship hulls to its destination at Luling, La." Moreover, in the first quarter of 1978, "the traditional U.S. surplus in trade of manufactured goods declined to the point of a $3 billion deficit," and "imports of machinery, transportation equipment and manufactured goods rose dramatically, suddenly overtaking oil as the biggest component of the country's trade deficit." [44]

In the words of Dr. Philip Handler, President of the National Academy of Sciences:

> **The topic of technological innovation is on the front page of the newspaper day after day. It is debated on talk shows, a concern of the Congress, and a central concern of the executive branch * * * if American streets did not abound in Datsuns, Toyotas, Mercedes, and Hondas, if most of our purchases of household electronics were those made by General Electric, Westinghouse, and Zenith rather than by Sony and Panasonic, if those cameras and pocket calculators we carry were of domestic manufacturer * * * we would feel rather differently about this.**[45]

[38] NSB, "Science Indicators 1976", p. 3.
[39] John M. Berry, "Productivity Fell Sharply in 2d Quarter," in Washington Post, Washington, July 21, 1979, p. A1.
[40] NSB "Science Indicators 1976," p. 5.
[41] *Ibid.*, p. 2
[42] *Ibid.*, p. 3.
[43] "Vanishing Innovation" in Business Week, July 3, 1978, p. 48.
[44] Dewar, pp. A1 and A22.

The inroads of foreign manufacturers in consumer products are tangible indicators of the U.S. lag in innovation. But we can infer the lag just as well from the intangible, potential products, processes, and services which our society needs, but which technology has not yet created. These intangible indicators are just as valid for assessing the effectivness of innovation in our society as are the other indicators discussed above.

Thus, we all reognize the need for new technologies to aid in energy conservation and in the production of alternative energy sources; in pollution control technology; in automobile propulsion systems; in mass transit; waste recycling systems; rural telecommunications; health care delivery systems; public safety systems; and a host of other areas. In many instances, the basic science is adequate for substantial progress; yet innovation does not take off and move ahead as it should and could. Sometimes it may be due to the difficulty to aggregating sufficient market demand; sometimes to the inability to marshall sufficient incentives for entrepreneurs; sometimes to the presence of institutional or regulatory barriers; sometimes to the unavailability of sufficient capital; or the absence of managerial skills where they are needed.

A 19th century sage once remarked that if you built a better mousetrap, the world would beat a path to your door. But in the complex 20th century an improved solar collector, for example, may prove to be of no avail if it does not meet local building codes or FHA standards, if insufficient capital is available to exploit it, if an adequate market cannot be readily stimulated, or if the inventor or inventing organization does not have proper incentives or managerial skills to promote and produce the product. But whatever the reason or combination of reasons, the simple fact is that innovation is not occurring rapidly or effectively enough to meet many critical national and social needs.

Thus whether we consider past performance or present potential, current challenges or foreign competition—whether we examine patterns of capital investment or R. & D. funding, patents, productivity, international trade, or compelling national needs for new technology—we inescapably arrive at the same conclusion: That U.S. innovation is lagging.

Yet we know the enormous significance of innovation to national security, economic vitality, and social progress. And we know that the impediments to innovation are not intrinsic obstacles or insuperable barriers: They can be overcome. What then should we do about them? How should we proceed to ameliorate innovation?

The Process of Innovation

Before we can delineate a national strategy for stimulating innovation, we must examine the innovative process, establish overall policy guidelines, and identify target areas for Federal action, along with the goals to be pursued in each area.

First, we must be clear on what we mean by technological innovation. We do not mean merely the conception of a new scientific idea or research discovery. Nor do we mean merely an invention, or completion of a technological development, or even its incorporation in an engineering system capable of producing it.

At the heart of every innovation is a unique coupling or matching of some technological capability with a market need or opportunity. When this conceptual coupling has been turned into a tangible product, process, or system—which has been disturbed and used successfully within the market—then, and only then, can we say that an innovation has occurred.

So the notion of innovation is extremely broad and encompassing and involves elements of basic scientific research, invention, engineering know-how, marketing, finance, production, and management; but in all cases depends on the imaginative matching of technological capabilities with economic and social needs or opportunities.

Now how does this process occur? At one time innovation was naively viewed as a simple, linear progression whereby basic research led to applied research which in turn led to development or invention, which engendered further engineering, and then production and use. This is now recognized as a simplistic, misleading characterization.

Technological innovation is not a simple, straightforward sequence of events that proceeds with deterministic regularity toward predictable ends. The singular term "process" ascribes too much simplicity and uniformity to what is in reality an exceedingly involved set of processes that follow a complex course of events that is often highly creative and unpredictable.[46]

There is nothing linear about the process of innovation. It can start from many points; it involves many dead ends, new starts, and innumerable feedback loops; and it is riddled through and through with risk. At its most crucial points, it entails creative leaps of imagination which can't be predicted or planned. When this author 10 years ago constructed a comprehensive systems model of the processes of technological innovation, the result was a model which depicted the interrelationships among 93 separate functions and hundreds of subfunctions.[47]

[46] Ellis R. Mottur, "Technological Innovation for Civilian, Social Purposes". Washington: George Washington University. July 1971, p. 162.

To understand the variations possible in patterns of innovation, one need only consider the starting point of particular innovations. Some for example, do not start from new research knowledge, but draw on knowledge which has been available for long periods. Thus, the reflection of radio waves by metallic objects was first demonstrated by Hertz in 1887, but the development of radar did not commence in earnest until 1934.[48] In other situations, however, new research findings can lead rapidly to innovation. Thus, Shockley theoretically predicted the possibility of the transistor in 1949; by 1951, Bell Telephone Laboratories announced the actual invention of the junction transistor; and by the mid-1950's, transistors were being mass-produced throughout the Nation.[49] However, in most instances the vast majority of necessary scientific advances have been made long before the innovation gets underway; a study by Illinois Institute of Technology, for example, showed that 90 percent of the essential scientific base had been established 10 years or more before the innovations occurred.[50]

Another variable which affects the rate and focus of innovative activity is the stage of development of the firms involved. Thus, "following the birth of a new product, the product design changes rapidly and radically: it is fluid, the manufacturing process is loosely organized and unsettled, and the organization is adaptive. Conditions at this point constitute the initial or "Fluid" stage of development and at this "Fluid" stage, major product innovations are rather frequent. * * * A turning point occurs with the emergence of a "dominant design" * * * that offers superior performance. * * * As the product and the manufacturing process develop over time, costs decrease, product designs become more standardized and suitable for broad market segments and change becomes less fluid. At the same time production processes, designed increasingly for efficiency, offer higher levels of productivity. * * * The nature and sources of technological innovation shift with these structural changes in product and process. Innovation becomes more incremental and technological progress takes the form of steady evolutionary development. Major innovations with potential to reshape the product or greatly improve productivity originate more frequently outside the firm and industry."[51]

Sometimes new technological developments virtually generate their own markets as in the case of computers and lasers.[52] Sometimes national needs serve to stimulate innovation as in the case of synthetic rubber during World War II or pollution controls at the present time. But in all cases, someone has to match the market need with the technological capability.

[47] Ibid., "Part II—Systems Model of the Processes of Technological Innovation," pp. 161–348.

[48] Robert M. Page, "The Origin of Radar." New York: Doubleday, 1962, pp. 13–40.

[49] Richard R. Nelson, "The Link Between Science and Invention: The Case of the Transistor," in National Bureau of Economic Research, "The Rate and Direction of Inventive Activity." Princeton: Princeton University Press, 1962, pp. 549–583.

[50] Illinois Institute of Technology, "Technology in Retrospect and Cultural Events in Science (TRACES)," Report for the National Science Foundation. Washington: NSF C535, Dec. 5, 1968.

[51] William J. Abernathy, "The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry," report of the Harvard University Graduate School of Business Administration, 1977. Executive summary, pp. 7–8.

[52] Nathan Rosenberg, "Science, Invention, and Economic Growth," Economic Journal, vol. 84, March, 1973. March 1974, pp. 90–108.

Generally, innovations don't happen by themselves. Moreover, in most cases a single individual has to take the lead in pushing the innovation forward against the innumerable obstacles that invariably arise. This entrepreneur or "innovation champion" (as Donald Schon has dubbed him) must serve as the change agent who makes the innovation happen in practice.[53] For in the final analysis, the success of most innovations depends on the initiative, imagination, judgment, commitment, and courage of particular individuals who are willing to place their time, talent, reputations, and careers on the line in situations of considerable uncertainty and risk. Providing such individuals with effective incentives must be a paramount imperative of public policy for innovation.

A point which cannot be overemphasized is that "uncertainty is inherent in technical innovation." [54] Along with this uncertainty factor goes an extremely high failure rate for innovations. Thus, a study by Edwin Mansfied showed that for every 100 projects which were initiated, only 57 were completed technically; 31 of these were commercialized, and only 12 of the original 100 eventuated in market success.[55]

In any case, in order for a particular innovation to succeed, it must embody the following elements:

First, there must be the creative coupling within someone's mind: Involving the perception of a new way in which a possible technological capability can be shaped to meet some economic, social, or human need; or to take advantage of some opportunity. This imaginative coupling or matching within the human mind is at the heart of the innovative process, but it must be accompanied by all of the following elements if it is to produce success.

Thus, second, there must be an effective change agent or "champion"— who may not be identical with the inventor or originator of the innovative concept, but who could be an individual enterpreneur, investor, or corporate or Government official—who persists in the commitment to make the innovation happen.

Third, it must be possible to tap or stimulate a sufficient market, in which the innovation can reach the scale or volume necessary for success, and in which the innovation can withstand the buffeting of competition.

Fourth, there must be access to sufficient capital to obtain the resources necessary to enable the innovation to succeed.

Fifth, the combination of potential rewards and risks, along with the perceived probablity of success for the innovation, must be sufficiently attractive to justify investment of the necessary capital when compared with alternative uses to which it could be put.

Sixth, adequate managerial skills must be brought to bear on the shaping of the innovation from research, invention, or initial development through any additional engineering that may be required, and through production, marketing, distribution, and sale within the market.

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[53] Donald A. Schon, "Champions for Radical New Inventions," Harvard Business Review, vol. 41, No. 2 (March–April 1963), pp. 77–86.
[54] Donald A. Schon, "Technology and Change". New York: Delacorte Press, 1967, pp. 24–32.
[55] Edwin Mansfield, "Research and Innovation in the Modern Corporation." New York: W. W. Norton & Co., 1971.

ATTACHMENT B

Some Tales of 'Copycat' Products Are Best Left Untold, Sterling Drug Learns

By Bill Abrams
Staff Reporter of The Wall Street Journal

If you steal it, don't flaunt it.

That's marketing advice Steven W. Lapham would do well to remember. If he had heeded it last November, he might have kept himself and his employer out of court.

Mr. Lapham is new products director of Lehn & Fink Products Co., the Sterling Drug Inc. division that makes Lysol and other household cleansers. Four months ago he was a guest speaker at an American Marketing Association new products conference.

"Replicate, don't innovate," was Mr. Lapham's theme. "Trying to innovate as the only way to success is one of the greatest myths of new products ever created," he said.

Instead, he suggested, be a copycat. "Someone else has gone and done your homework for you," he said. "They have taken the risk, the time, and spent the dollars."

His example of successful mimicry: Lehn & Fink's own Love My Carpet rug and room deodorant, a copy of Airwick Industries Inc.'s Carpet Fresh.

Mr. Lapham told how Lehn & Fink was skeptical at first about Carpet Fresh, which was test-marketed by Airwick in mid-1977, and introduced nationally a year later. "We found it pretty hard to believe that Carpet Fresh had any potential at all," he said. "What housewife in her right mind would sprinkle white powder onto her carpeting before vacuuming? Who dirties their carpet first? The whole idea had to be wrong."

A Quick Copy

It wasn't. When Lehn & Fink monitored Airwick's test markets, it found that Carpet Fresh was "a terrific idea," Mr. Lapham explained. In December 1978, Lehn & Fink began a crash project to duplicate Carpet Fresh. A copy was on supermarket shelves within six months—far sooner than the two years or more it usually takes to develop a new product.

Mr. Lapham's candor may have startled his audience, but he didn't create much of a stir until a month later when Advertising Age, a trade publication, reported his remarks.

Then the harrumphing began. Marketing executives privately scorned Mr. Lapham's approach as one that did little to promote economic growth; some were surprised that such an important name in consumer products as Sterling Drug would stoop to mimicry. An Ad Age editorial said, "Where would the replicators be without the innovators? They wouldn't even have material on which to base their speeches."

Four weeks after the Ad Age story, Airwick finally spoke up—in federal district court in New Jersey. The company charged Lehn & Fink with patent infringement and asked for damages totaling triple the profits from Love My Carpet. Although Airwick officials say they had been contemplating litigation before Mr. Lapham's speech, the suit quotes his remarks extensively.

Imitation, of course, isn't unusual in marketing. Mr. Lapham's thesis had been put forth 13 years earlier in a Harvard Business Review article, "Innovative Imitation," by Harvard marketing theoretician Theodore Levitt. He urged companies to search for products they could copy through "reverse R&D — working backwards from what others have done, and trying to do the same thing for oneself."

Ample Examples

Examples of successful copycats abound. International Business Machines Corp. wasn't first in computers nor RCA Corp. in television sets, Mr. Levitt noted. Mr. Lapham pointed to General Foods Corp.'s Jell-O pudding following R. J. Reynolds Industries Inc.'s My-T-Fine and Schick Inc. razor blades imitating Gillette Co.'s.

Even Airwick says it sometimes follows other companies' ideas. "When we see something successful, we try to put a

unique twist on it," says Michael Sheets, president of Airwick's consumer products division. The company's new Air Wand room freshener, for example, is strikingly similar, except for its package shape and scent, to Clorox Co.'s Twice as Fresh.

Nonetheless, Airwick executives say that they were surprised by Lehn & Fink. "We were upset about the fact that they came in with an exact copy," says Frank Conkling, Airwick chairman. "If they had gone us one better in technology, we would have said, 'c'*est la guerre*'."

Lehn & Fink's quick copy also stung Airwick's pride. Airwick, which had been acquired by Ciba-Geigy Ltd. in 1974, had only recently begun transforming itself from a stodgy one-product company into an innnovator. And with Carpet Fresh, it had created more than a new product; it started an entirely new product type. Before, people simply vacuumed or shampooed their rugs. Carpet Fresh was a deodorizer; Airwick asserts that it removes smells from carpets, and as the powder passes through the vacuum's exhaust, perfumes the entire room.

It was also a rapid success, especially among households with infants, puppies and cigar smokers. Sales grew to about $60 million last year, and with other competitors jumping into the market, Carpet Fresh's market share was roughly 60%, Airwick says.

Airwick has also sued a manufacturer of store-brand versions of Carpet Fresh for patent infringement, but it is Lehn & Fink that has caused all the ruckus in the industry.

Did Mr. Lapham or Lehn & Fink anticipate such a strong reaction to the marketing association speech? Sterling has since silenced Mr. Lapham and says only that it has a "defensive case" against Airwick; Lehn & Fink's answer to the Airwick complaint is due soon.

To new product executives at other companies, though, the Lehn & Fink affair is mostly a case of indiscretion. "If you can imitate and get away with it, you should hide what you're doing," says a marketing expert versed in the law. "You don't win anything by shooting your mouth off in the marketplace."